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Growth Center at the Foundation

NSF Gears Up for Big New Engineering Program

Against a background of Congressional charges that the National Science Foundation has been neglecting engineering research and training, NSF has invited universities to make proposals for a new program of Engineering Research Centers (ERC). There's been a huge response, which, in turn has aroused anxiety among NSF's science clients, some of whom feel that the $143 million that engineering now gets from NSF's $1.5-billion budget really comes out of their hides, and that the new program will rechannel even more support.

To hear what NSF has to say about the ERC program, SGR spoke October 24 with the NSF Assistant Director for Engineering, Nam P. Suh, who just the week before came to the post from MIT, where he was Professor of Mechanical Engineering, Director of the Laboratory for Manufacturing and Productivity, and Director of the MIT-Industry Polymer Processing Program; also with Lewis G. Mayfield, an NSF veteran who heads the Engineering Directorate's Office of Interdisciplinary Research, which administers the ERC program. Following is the text, edited by SGR:

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SGR. Where does the Engineering Research Centers program stand now?

Mayfield. We have $10 million for this fiscal year. We received 142 proposals, from 107 institutions, as of the October 1 deadline. All very serious, thick proposals. Only two major schools did not submit proposals—Caltech and the University of Houston. Altogether, they're asking for $2.2 billion over 5 years.

SGR. Your $10 million won't go far.

Mayfield. No, it can't. So it really depends on what kind of money is available later on. What we have now is essentially startup money. We're hoping for larger budgets later on, but, of course, nothing approaching that amount requested. The goal is 25 centers, with funding of about $2.5 to $5 million a year each.

SGR. The interest and hopes for this program seem out of proportion to the modest amount of money that's involved.

Suh. It's actually a substantial sum of money for many institutions. This is a new startup area that engineering schools have not had sufficient resources to cover. As a new effort that universities ought to undertake, this program will enable them to do a lot more than they've been able to. In that sense, the money amounts to a very signficant sum. From our point of view, we hope we will select only those universities which will really undertake significant new efforts that they could not undertake in the past. That's a very important criterion. We feel that this program will indeed change the way we educate students in two different areas. One is that universities have really not done a very good job of teaching students the overall systems aspects of engineering. Engineering consists of both analyzing small details as well as synthesizing large systems and teaching engineers how all this fits together. The universities have not been able to do that when one professor works with one student; that's really not a viable mode for that kind of education.

On top of that, we feel that industrial input to university education is very important, not to dictate the terms of the educational process, but mainly to introduce the

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In Brief

With unusual ardor, lobbyists worked full blast for and against the NIH authorization bill that President Reagan vetoed October 30. The American Psychological Association liked the provision that would have included behaviorial and social scientists on NIH advisory councils, and instructed its members on how to send a 20-word Western Union "Opiniongram" to the White House, for only $4.45.

The NIH leadership and its medical school allies were opposed to the bill's establishment of two new institutes, for Nursing and for Arthritis and Musculoskeletal and Skin Diseases. Reagan's veto message cited the expense of the two new institutes and the bill's "overly specific requirement for the management of research."

Foreign students received 24 percent of the science and engineering PhDs awarded in the US in 1983, up from 21 percent 10 years ago, NSF reports. Altogether, 17,900 science and engineering doctorates were awarded in 1983, continuing the upward climb that began in 1979. But it's now taking longer to get a doctorate, NSF says. The median time between the baccalaureate and the PhD has risen from 6.6 years in 1970 to 8 years in 1983.

. . . Applicants Face Many-Layered Review Process

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kinds of problems that our students should be confronted with and also to teach what kind of boundary conditions engineering solutions must meet to make them viable.

Mayfield. The goal is to develop fundamental knowledge in engineering fields that will enhance international competitiveness of US industry. Another object is to prepare engineers to contribute through better engineering practice. The centers are supposed to be multidisciplinary, not just a single electrical engineer or a group of them. They can be multidisciplinary and have chemists and physicists, but the center of gravity should be engineering.

SGR. Would that include social scientists or medical people?

Mayfield. If appropriate.

SGR. Did you provide the applicants with financial help for the work that went into the preparation of proposals?

Suh. No. One of the deans of a major university told me that all the universities together have so far have spent more money on the proposals than the $10 million allocated for the first year of the program.

Picking the Winners

SGR. How will the winners be chosen from among all the proposals?

Mayfield. We will use our normal review procedure, but it turns out that to prevent undue conflict of interest, we have a little problem because we don't know for sure yet how many faculty members are listed in these proposals, but we can see it's going to be close to 3000. We've said if they're listed in a proposal, they can't participate in the preliminary review. So, we're scrounging around trying to find guys who aren't listed but still have some competence in it.

Suh. We're going to end up having a large number of industrial people review these proposals.

SGR. Will they be in the majority of the reviewers?

Mayfield. I suspect so. We're sorting the proposals into piles that have similarities. We're planning on having about 70 initial reviewers and each of them will make written reports on at least 3 proposals. Then we'll do another exercise, which is essentially to divide the reviewers into 4 groups and have them sort the applications into categories of highly recommended, recommended, and not recommended.

Then there's the main panel, the Engineering Research Centers panel, and it makes the final decisions. It's going to consist of about 10 to 15 people, and they'll take the results from the reviewers and reduce the number to about 30, and then we'll have them then go over it and cut it in half again. And then we'll site visit those. And then we'll make recommendations on the result of those site visits for however many we can afford.

So far, we've picked only the co-chairmen of the Engineering Research Centers Panel: Eric Walker, former President of Penn State, and C. Lester Hogan, former President of Fairchild Camera and Instrument. Their panel will pick the winners.

First-Year Numbers

SGR. How many universities will get money this year?

Mayfield. There are several factors involved. One, the size of the grants that actually come to the top. But it will be someplace between 7 and 10, possibly 12.

SGR. How much will they each receive?

Mayfield. We have a complex scheme for funding. If you do it this way, you can provide a lot of flexibility for yourself in future-year funding. If you have 10 of them, they'd get $1 million apiece. One million would satisfy practically all of them from mid-April until October 1, and then come October 1, when you know what kind of money you have for the next fiscal year, you complete the funding of the first year. And then come April, you can fund the second year. We've worked through a little scheme that allows us a great deal of flexibility.

SGR. How many students will be in the centers?

Mayfield. We thought we should involve at least 10 percent of the graduate student body in a given engineering school. That may be realistic in some schools, but not in others. So, we are leaving it more or less up to

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New NSF Chiefs Helped Design Centers Program

The National Science Foundation's Engineering Research Centers program seems assured of strong support at the top of NSF, for it was conceived by a panel that included two engineers who were later appointed to run the Foundation: Erich Bloch, who last June went from an IBM vice presidency to the post of NSF Director, and Nam P. Suh, Professor of Mechanical Engineering at MIT, who was appointed last month to head the NSF Directorate for Engineering.

They were members of a 19-member panel appointed late last year by the National Academy of Engineering in response to a request for help from NSF, whose relations with engineering have rarely pleased science, engineering, or the disciplines' friends in Congress. The usually cumbersome Academy moved quickly on this one, holding three days of meetings in January. Its report, dated February 15, *Guidelines for Engineering Research Centers*, set out the formula that NSF is now closely following.

It is doubtful, however, that the scope and pace will satisfy Congress, which, in the last session, was more impatient than ever with NSF's treatment of engineering. Fired up by the popular belief that science and technology are keys to regional economic prosperity, the 98th Congress introduced a record number of bills invoking the magic words "research," "technology," "engineering," and so forth.

At the initiative of the House Science and Technology Committee, which regards NSF as its baby, Congress balked at anything more drastic than the cosmetic addition of "engineering" to various parts of NSF's basic legislation. But for many legislators that's not enough, and when Congress went home, there still were bills floating around to set up a separate agency for technology and engineering as a counterpart to NSF.

The large and vigorous response to the Engineering Research Centers program is not only attributable to the smell of money—it's there, but in relativly small amounts at this stage. Perhaps even more important is the expectation that this is a good one for establishing a ground-floor presence. Washington is, of course, fickle in its dealings with academe, as oceanographers, space researchers, social scientists, and many other former favorites can testify. But as far as anything can be foreseen about trends in federal spending for R&D, more emphasis on technology seems assured—which raises the question of whether the growth will be at the expense of basic science.

The budget that the Administration is preparing to present to Congress early next year is said to maintain the same strong pace of growth for basic research that has prevailed during the previous three years. Furthermore, NSF tradition calls for a great deal of deliberation and little speed in setting up new programs, which means that the Engineering Centers program will not be calling for substantial sums for at least two more years. But, as Suh and Mayfield note in the accompanying interview, NSF, which now budgets $143 million for all the programs in its Directorate of Engineering, is aiming to get up to a level of $100-$125 million a year for just the Engineering Research Centers.

Clearly, this new starter comes with financial and policy implications that have received almost no public attention.—DSG

Engineering Centers

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the institution. Nevertheless, that's the spirit of the program. We'd like to involve a large number of graduate students, as well as undergraduates. Another element that we're very keen about is that, typically in many universities, cross-disciplinary research cannot be done, for many different reasons. In many cases, there are intra-institutional barriers, such as faculty members not being able to cross departmental boundary lines. We'd like to use this centers concept as a means of fertilizing and cross-breeding different ideas. We'd like to see the infrastructure established within the universities so they can carry out cross-disciplinary research, not in name only, but really carry it out.

That will be one of the elements we will be looking for, and we think the only way we can accomplish that is if they institute a structure so that the young faculty members can properly be rewarded for participating in these efforts. Universities have been concerend about the issue of cross-disciplinary research, but I think we're simply providing another vehicle for them to do something about it.

SGR. Is industry expected to provide support for the centers?

Suh. We hope that industrial firms will participate in a major way, providing funds, equipment, as well as personnel time, so that these centers will be geared to deal with important technologies.

Mayfield. Industry is also supposed to help focus the research activities.

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. . . Long-Term Support Planned for New Centers

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SGR. Is industry participation required for a university to get one of these centers from NSF?

Suh. We didn't specify it precisely in those terms, but our feeling is that as part of the evaulation process, it will become clear that in the absence of major industrial participation, these centers will never accomplish what they have to.

Mayfield. We expect them to include participation by engineers from industry and government laboratories, but mostly from industry.

SGR. Is there a plan to phase out NSF support for each center gradually, as you do in some industrial programs, and make the university find other sources?

Suh. At this time, there's no intention of that. There are two kinds of examples we can cite. The materials research laboratories have been supported by NSF on a continuing basis for many years. On the other hand, the NSF University-Industry Program has a phaseout aspect. But in the case of the new Engineering Research Centers, we feel that they have to operate on a long-term basis, and also be able to deal with the long-range issues that cannot be supported by industrial firms, because they are not quite justifiable in terms of short-term industrial needs.

Developing Knowledge Base

SGR. What would be an example?

Suh. Thirty-four of these proposals are in the field of manufacturing. The kinds of things that industrial firms are interested in are, for example, making use of robots to replace their workers and maybe pick certain parts and transfer certain parts. So that in those cases, what they're interested in is a very quick solution to those problems. But there are long-range issues, such as how to optimize large manufacturing systems, for which we do not have a knowledge base. That's the kind of research project that will not be that attractive to industrial firms because they don't really see what the outcome will be in terms of applications. But you can develop the knowledge base and that can be generalized and then applied to many industrial situations. At that point, I think industrial firms will come in. But the reason industrial participation is important from the very beginning is that it can sort of indicate the kind of directions they'd like to see these effort head toward. In that sense, I have a feeling that these centers will provide the very fundamental knowledge that will significantly improve the way we practice engineering design and so forth. There are many, many examples. Biotechnology is another one. There are many small biotechnology firms in the country, but if you look at the long-range issue of mass production in biotechnology and also in manufacturing, we do not have the manpower or the research base. We are not producing enough people. In fact, in the case of biotechnology and manufacturing, we are producing only maybe 10 or 12 PhDs a year for the whole country. Clearly, to generate PhDs who are educated in the long-term issues, we cannot depend on industrial suppport, because that interest is yet to be developed.

SGR. One of the functions of the centers, then, is to train people to go from the laboratory phase to large-scale production.

Suh. That's one of many things. It's a highly desirable one. The German situation provides not a complete example of what we want to do, but at least an aspect. In Germany they have large institutes in manufacturing, in Berlin, Aachen, Stuttgart, and many other places. They produce large numbers of PhDs and master's degree people in the field of, say, manufacturing. When an industrial firm hires a manufacturing engineer in Germany, these people with advanced education end up

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Manufacturing Tops the List

The whole wide world of technology was open to the proposal writers for NSF's new program of Engineering Research Centers. But among the 142 proposals that came in from a total of 107 institutions, a large proportion were concentrated in just a few areas.

A rough breakdown by general category shows that at the top of the list were 34 separate proposals for research on manufacturing, followed by 12 for materials, 11 each for chemical processing and microelectronics, 10 for computers, 8 each for construction and lightwave and optical technology, and 7 for biotechnology.

The aero and space category drew 5 proposals, as did particulate and mutliphase processes, ocean engineering, and water. Then came fluids and separation processes, with 4 each, and energy and telecommunications, with 3 apiece. Transportation was the subject of 2 proposals, and 1 was received for each of the following: cold regions, electronics, power, lighting, and superconductivity.

The subject areas of the returns only partially reflect hints that astute proposal writers seek in program announcements. Thus, the NSF announcement stated, "Examples of subject areas include systems for data and communications, computer-integrated manufacturing, computer graphics design, biotechnology processing, materials processing, transportation, and construction." To which NSF added, "These examples are given only to illustrate concerns which a Center may address."

. . . Money for Instruments, None for Buildings

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becoming the key members of the industrial operation. That's very different from our case. Typically, people in manufacturing in the US have moved up the ladder, starting in some cases as a foreman. I hope we can change the situation and thus have a major impact on industrial practice. But at the same time, I think large numbers of these people will go to universities to teach.

SGR. Is there a center or program in the country that's an example of what you're aiming at?

Suh. I hope the Center I was running at MIT was one of those examples. At first what we started was a Joint MIT-Industry Cooperative Research Program with a half-million dollars or so that we got from NSF over a period of 5 years. It was one of 10 such programs supported by the Foundation. The program demonstrated that universities and industries can work together, and indeed that the industrial involvement is very valuable for the educational process, as well as showing that the research output from MIT can materially help these industrial firms. So, MIT then decided that that example should be expanded and made into a major center in the field of manufacturing. So, we started the center in 1977 and since then we have expanded our relations with industry. At the time I left, there were about 40 or 50 companies participating in the center, and about 70 percent of the funding came from industrial firms. But the problem with solely depending on industrial funding is that they are not interested in long-term issues. And rightly so, because they are there to make profits, and they do not deem it necessary to support real long-range research projects for which they cannot foresee the application. Therefore, there's a danger in running university centers solely dependent upon industrial inputs, because that can in some ways compromise important issues that universities must address. Hopefully, our new centers can do both. By having substantial input from the National Science Foundation, they can establish enough intellectual power so that they can look at the long-term issues, and at the same time keep applying the findings that derive from basic research to more immediate industrial applications.

Mayfield. We're going to fund these centers as a continuing grant, which means that essentially we make a commitment for 5 years. The only proviso is that at the end of the third year we're going to review them very carefully to determine whether they'll continue beyond the fifth year.

Suh. The maximum support we'll be looking at is up to $5 million per year. In terms of the experience I've had at a private university, that amount can really provide a viable core research group, and that will, in fact, make [the recipient] a national institution, an institution that can become a national resource in some key areas of engineering importance. The $5 million can really go very far.

SGR. If a school doesn't make it in the first annual round, does its application remain alive for the second competition?

Mayfield. No. We'll be issuing a new announcement for the second year. The principles will remain the same. But for the time being, we are not soliciting any more proposals.

Suh. I think that in some ways, the important thing about these research centers is that we really hit a very responsive chord. We are in resonance with a need. That's why these institutions responded. The people out there are very excited about what the Engineering Research Centers can do for them. I think this program is attuned to the needs of the engineering schools.

Mayfield. I've had people tell me that the simple act of the dean saying we're going to work on this has gotten department chairmen together for the first time in 4 years. What's apparent is that administrators have been searching for a mechanism to make some changes in their organizations. This has given them a vehicle for talking about it and doing some work. A lot of them are preparing [the proposals] for us and for their own use, within their legislatures and other places, because they've put a lot of work in it.

SGR. Would NSF provide construction money for a building for one of these centers?

Mayfield. No, not this year, but we will provide for some renovation, if it's needed, and we'll provide for instrumentation. There's been a hue and cry from engineering schools that they're far behind in their needs for instrumentation and equipment. If that's a factor that they need for their activity, then it's included in their proposal.

SGR. What accounts for 34 proposals for research on manufacturing and only one for research on power?

Suh. I think what it's saying is that the universities feel that some of these areas are very important, and yet they have not been able to move into them, because of resources, not only in terms of people but also buildings and everything else. They're using this opportunity as a means of establishing engineering research programs. Manufacturing and biotechnology are clearly cross-disciplinary subjects. These are the subjects that cannot be handled by any one engineering discipline.

SGR. Has there been Congressional pressure in behalf of particular institutions?

Mayfield. Not what I'd consider pressure. There has been interest. [Congressional] letters have not supported a single university, but they have supported areas of activity, subject areas.

Industry Planning 12-Percent R&D Boost for '85

The long-running growth in company-financed research and development in the US will average 12 percent this year and will rise by the same amount next year to a record $55 billion, according to the National Science Foundation's latest survey of industrial R&D plans.

Based on responses from 87 major industrial R&D spenders, including 18 of the 20 top-spending firms, the NSF report provides a reasonably reliable and comprehensive look at the spending patterns of industrial R&D. In dollar amounts, it now surpasses the once-dominant federal sector, though Washington remains the mainstay of basic research. When federal and industrial R&D spending are put together, they total well over $100 billion, which easily surpasses the combined R&D spending of Western Europe and Japan.

The report conveys a picture of industrial confidence in the value of R&D spending. "The respondents noted," it states, "that the 1981-82 recession and the recovery that followed solidified their belief that to maintain their companies' sales, profitability, and market share, it was imperative to strengthen their R&D programs." Improved business conditions were also credited with bringing forth more money for R&D, as was the belief that R&D is a "means to protect profitabilty and market share," NSF found. On an industry-by-industry basis, the Foundation reported the following:

• Professional and Scientific Instruments: With an average increase of 17 percent for R&D in 1984 and the same for 1985, this group is the growth leader. NSF says the boosts are attributable to a rapid introduction of new products and a quickening pace of obsolescence, a growing demand for medical diagnostic equipment, the spur of foreign competition in American markets, and the requirements of industrial laboratories for more sophisticated equipment.

• Machinery: The industry as a whole will increase R&D spending by 16 percent this year and again next year. The computer segment will go up by 20 percent, but the farm equipment and machine-tool segments are "anticipated barely to keep pace with inflation." NSF said that the trailing industries report that they "have begun to diversify away from traditional machine tools and farm equipment and were increasing R&D efforts in new areas such as robotics, automation, and metal composites."

• Chemicals: The spending increases for R&D will average only 11 percent in 1984 and 1985, one reason being a drop in the growth rate of pharmaceutical research spending. It remains high, but it's down to a 14-percent increase following a 19-percent annual growth from 1980 through 1983. NSF reported that "the availability of funds for research and development in this export-intensive industry is currently being adversely affected by the strength of the US dollar."

• Electrical Equipment: A 13-percent increase in R&D spending is taking place this year, but growth will drop to 11 percent year, NSF reported. The decline was attributed to Japanese saturation of consumer markets,

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R&D Tax Credits: Mixed Findings in Industrial Survey

NSF's industrial R&D survey provides mixed evidence on the disputed issue of whether tax credits for increased industrial R&D actually boost R&D spending or merely inspire creative accountancy. Congress isn't sure about the matter, and went home without extending the 1981 legislation that provides a 25-percent tax credit for R&D increases between 1981 and the end of 1985, when the law expires.

"In this year's survey," NSF reported, "slightly fewer companies (33 percent as opposed to last year's 37 percent) reported that this tax credit had favorably influenced their R&D budgets. These companies account for 22 percent of total company-funded research and development. Officials of companies increasing R&D expenditures as a result of the tax credit mentioned that their firms were accelerating some long-range programs and adding some small short-term projects.

"Most R&D officials were very knowledgeable about the tax laws affecting their R&D budgets," the NSF report continues, "and many recommended extending, or even making permanent, the tax credit . . . so that their companies could take maximum advantage of the credit in future budget planning."

The survey received favorable comments on the tax-law provision that permits R&D contracted to universities to be included in a firm's R&D spending for the purpose of qualifying for the R&D tax credit. "This encouraged several companies to sign research contracts with universities during the tax-credit period," NSF reported. It also found that tax deductions for donating new equipment to universities "provided an incentive for several companies to make such donations."

The NSF report did not comment on the contention that a lot of fudging is behind the claimed good results of the R&D tax credit, or that the credit ranks low as a factor in industrial R&D decisions.

Keyworth Says Media Distorts Reagan R&D Record

From a speech, "Do the Media Cover the Real Issues in Science and Technology," by Presidential Science Adviser George A. Keyworth II, October 22 at the University of Pennsylvania:

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I would put near the top something that has frustrated me for the past three-and-a-half years. One of the central elements of federal science policy during the Reagan Administration has been the restoration of strong support for basic scientific research, with a particular emphasis on support of research at universities . . . . The bottom line . . . has been an increase . . . of 55 percent over 4 years, or nearly 30 percent in *real* growth. That happens to be the greatest increase for university basic research in nearly two decades . . .

Yet, at least until *very* recently, I defy you to find media accounts of the Administration's policy with regard to science that don't flatly assert that basic research has been and continues to be gutted by the President . . . .

The story of budget cuts first surfaced during the transition months of early 1981, at a time when there *were* threats of some cutbacks. By late 1981, however, the real story was one of the start of rapid growth and the emergence of a strong Administration science and technology policy rationalizing that growth. Yet for the past three years, we've seen the media trot out the old story . . . .

Just four days ago, . . . an article about the Nobel prizes in the *Washington Post,* [stated], "Many American scientists have warned for years that cuts in research budgets dating back to the early 1970s were threatening American leadership in numerous areas of science."

The impression such a bald statement leaves is unambiguous—Government is cutting funds for science. It's merely 180 degrees out of phase with reality.

Carnegie Aids Arms Studies

Arms-control remains one of the more blighted fields of research under the Reagan Administration, but it's flourishing in academe through a substantial infusion of money from the Carnegie Corporation.

The New York-based foundation has been emphasizing the field following a reorientation of granting priorities initiated by its President, David A. Hamburg, a psychiatrist who formerly headed the Institute of Medicine. Recent Carnegie grants include:

Harvard, $1.1 million for "research and education on the avoidance of nuclear war," and $250,000 for "research and training at the Harvard Negotiation Project on improving the US negotiating process."

MIT, $1.1 million for "support of the Arms Control and Defense Policy Program."

Stanford, $950,000 for "research and training in international security and arms control."

International Research and Exchanges Board, $394,000 for "meetings involving United States, Soviet, and East European scholars and policy experts."

American Academy of Arts and Sciences, $250,000 for a "study of weapons in space."

UC San Diego, $250,000 for "a study of warfare in space" by the Institute on Global Conflict and Cooperation.

American Physical Society, $200,000 for "a study of the science and technology of directed-energy weapons."

Industrial R&D

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the woes of the nuclear-power industry, and "growing acceptance of multi-company, multi-industry joint ventures, including the Microelectronics and Computer Technology Corporation and the Semiconductor Research Corporation."

• Aerospace: R&D spending will grow this year by 10 percent, and will drop to 9 percent next year, which is about half of the annual increase that the industry experienced from 1980 through 1983. The industry remains strong because of massive federal support of aerospace R&D, NSF reported. It also noted that "Officials from US aircraft manufacturers reported an increase in the formation of cooperative R&D ventures with foreign companies in order to enter additional markets or to obtain access to research not otherwise available here. They expressed some reluctance to cooperate with their US counterparts, despite the huge R&D expenditures required for major projects, because of perceived antitrust implications."

• Motor Vehicles: Relatively low but on the upswing, the industry will increase R&D spending this year by 6 percent and next year by 9 percent. NSF reported that "Substantial R&D resources are being devoted to developing robots and other forms of automation . . . . Other R&D efforts are being concentrated on improved transmissions, engineered plastics, chemicals, electronics, and aerodynamics for fuel efficiency."

(The industrial survey is summarized in a report, NSF 84-329, available without charge from NSF, Division of Science Resources Studies, 1800 G St. Nw., Washington, DC 20550).

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Science Mini-Mobilizes for Presidential Race

A 34-member group named Science Community for Mondale/Ferraro surfaced late in October, but it's a pale outfit in comparison to the Democratic scientific mobilizations of several previous campaigns.

Meanwhile, the only sign of similar activity on the Republican side is Engineers for Reagan, co-chaired by a former President of the National Society of Professional Engineers, Samuel F. Lee, of Louisville, Ky. The Mondale/Ferraro organization lists several scientists with some public name recognition, including Linus Pauling, Paul Ehrlich, John Holdren, Sidney Drell, and Murray Gell-Mann. But neither party group has drawn much notice in the campaign.

The Mondale/Ferraro group was organized by Arthur H. Purcell, Director of a Washington-based research organization, the Resource Policy Institute. Purcell, who was associated with similar undertakings in previous presidential campaigns, told SGR that the late arrival of the campaign group was regrettable, but that Mondale wasn't putting much emphasis on such campaign devices. Purcell said that the organization has provided speakers for political meetings.

Why so little political activity within the scientific community this year? The political mind of the community is difficult to plumb, but both the rank and file and the leadership are happy over those big budgets that the Reagan Administration has been pumping into R&D. That seems to take the edge off discontent over the Administration's primitive performance on arms control, environmental purity, scientific secrecy, and international scholarly exchanges.

Perhaps the key to it all is that Congress has looked after the life scientists by boosting the NIH budget while the Administration has been responsive to the physicists' hopes for bigger particle accelerators. And it's been very good, too, to NSF. That's not enough to inspire a scientific mobilization for Reagan, but it does cool the ardor of scientists who don't like his policies outside the charmed world of science.

The election has produced one other bit of science-related involvement—campaign contributions of $100 to $200 each to 8 House and Senate candidates by the Science and Technology Political Action Committee. SCITEC-PAC, as it calls itself, is related to the Washington-based National Coalition for Science and Technology, which describes itself as a "nonpartisan organization of scientists, educators, business people and engineers who are concerned about the growing crisis in US science education, scientific research and industrial productivity." The Coalition says it has about 1000 members.

The recipients of the campaign support are Reps. George Brown Jr. (D-Calif.), Bill Green (R-NY), Dave McCurdy (D-Okla.), Donald Pease (D-Ohio), and Claudine Schneider (R-RI), all seeking reelection; also, Rep. Albert Gore (D-Tenn.) Rep. Tom Harkin (D-Iowa), and North Carolina Governor James Hunt, who are running for the Senate.

The Committee said the 8 candidates have a "strong record of interest and involvement in science-policy issues" and that there's a "clear difference" between them and their opponents "on questions of concern to the science research and education community."

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